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(54) TOOTHBRUSH

(57) The source of radiation of optical range (3) is built-in the cavity (2) of handpiece (1) of tooth brush comprising the transparent brush head (8). The combination of scattering properties of brush head (8), type of radiation source (3) and brush transparency (7) allows to influence directly on different fields and tissues of oral cavity.

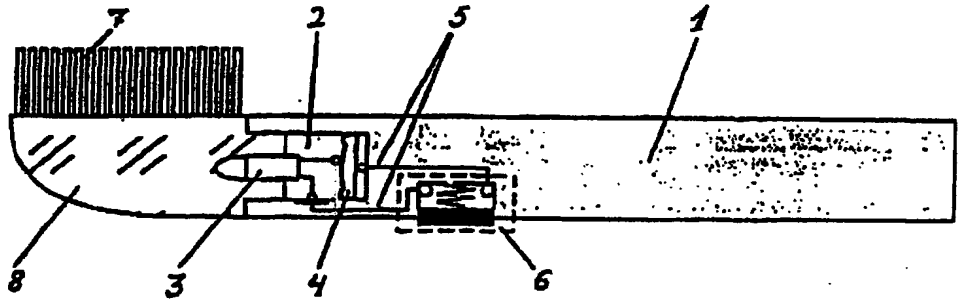

Fig. 1

EP 0 927 544 A2

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Description

The field of engineering

[0001] The invention concerns to tooth brushes and can be used in dentistry for profilaxis and treatment of oral deseases.

The previous level of engineering

[0002] It is known the tooth brush (PCT N90/0906, A61 N1/32, A46 B15/00 date of the publication 23.08.90) comprising the electrode on the handle and the electrode with sharpened edges in the base of bristle. The electronic circuit providing the conditions of application of bipolar pulse train (especially with 50 Hz frequency) to oral tissues and LED indicating the operation of electronic circuit are mounted inside the brush handle.

[0003] The main disadvantage of above device is that it is impossible to make the influence on teeth except the gum tissue.

[0004] It is known also the tooth brush which is the closest one from the technical point of view and can be accepted as a prototype (Japan N3-15883, A46 B15/00, A61 N5/06, D01 F8/04 date of the publication 04.03.91) comprising the handle with built-in power supply, heater and head with bristle made of special thermoactive material radiating in far infrared range.

[0005] The main disadvantage of the prototype is the absence of radiation providing the profilaxis and treatment influence on teeth and gum.

The subject of the invention:

[0006] The problem solved by present invention consists of the creation of the tooth brush providing the profilaxis and treatment influence on tooth tissues and soft oral tissues.

[0007] The specified problem is solved under the realization of the invention due to achievement of technical result consisting of application of radiation of optical range that provides the antiinflammatory and caries protective influence on oral tissues as well stimulates their regeneration.

[0008] The specified technical result under realization of the invention is achieved due to the fact that in the tooth brush comprising the handpiece with cavity, brush head with bristle and built-in the handpiece cavity electrically connected through the switcher the radiation source and the power supply, the radiation source is represented by the source of radiation of optical range and brush head is made of transparent material and may be disconnected from the handpiece.

[0009] The said light source may be represented by laser diode or light emitting diode.

[0010] The said light source may be represented by a filament lamp and handpiece is made of color transparent material.

[0011] The said brush head may contain the light scattering materials.

[0012] The said brush head may have the reflecting or back scattering coating and bristle is made of transparent material.

[0013] The said brush head may contain the photoluminescent substances especially dyes.

[0014] It is well known the phisiotherapeutic influence of visible and near UV and IR radiations which at low doses make the biostimulating action on tissues. The most efficient is the laser radiation (AS.Kryuk,, V.A.Mostovnikov, I.V.Khokhlov, N.S.Serdyuchenko. Therapeutic efficiency of low-intensity laser radiation. Minsk: Science & Engineering, 1986. V.E.Illarionov. The principles of laser therapy. M. Published by "RESPECT" of "INOTECH-Progress" Co.)

[0015] It is found out the antibacterial and antiinflammatory action of UV (330-380 nm), blue (440-450 nm) and green (514-590 nm) radiation. Besides that the red (630-640 nm) and near IR (830-1300 nm) radiation provides also the profilaxis and caries treating influence.

[0016] The profilaxis influence against caries is provided by irradiation of odontoblasts and tooth pulp due to waveguide effect of light propagation in the enamele prisms and dentinal tubules (see G.B.Altshuler, V.N.Grisimov. "The effect of waveguide light propagation in human tooth". Doklady AN USSR, v.310, N5, pp.1245-1248, 1990; G.B.Altshuler, V.N.Grisimov. "New optical effects in the human hard tooth tissues". Proc. SPIE. Lasers and Medicine, v.1353, pp97-102, 1991)

[0017] While the gums are irradiated both the antiparadontosis action and penetration of light inside teeth take place. The radiation is most efficient in the combination with massage of gums because the pressuring of alive soft tissue causes the increase of its transparency (see G.A.Askaryan "The increasing of transmission of laser and other radiation through the soft turbid physical and biological media". Kvantovaya Electronika, v.9, N7, 1982, pp.1370-1383).

[0018] The useful irradiation of a whole oral cavity is provided in the claimed tooth brush due to the presence of light source connected to the electrical power supply and transparent brush head which can be made of light scattering material.

[0019] The types of light sources are determined by the necessity of application of light with specified spectral parameters and dose that are useful for specified type of hard and soft oral tissues.

[0020] More intensive irradiation of teeth and gums are provided with tooth brush that has the transparent bristle and reflecting or back scattering coating of a brush head.

[0021] The photoluminescent substances especially the dyes being introduced into the brush head provide practically all the useful spectral range of oral cavity radiation under the influence of a single shortwave, for example, UV or blue light source.

[0022] The author suppose that the set of claims is the new one as well the engineering satisfies the criterion of invention.

The brief description of figures:

[0023] The subject of the invention is specified by the figures, where

fig.1 represents the tooth brush which comprises the radiation source in the form of laser diode or light emitting diode connected to the power supply through the switcher and transparent brush head..
fig.2 represents the tooth brush which comprises the radiation source in the form of filament lamp and brush head made of color transparent material.
fig.3 shows the tooth brush which brush head has the reflecting coating and bristle is transparent.

The best version of the invention:

[0024] The tooth brush (fig.1) comprises the handpiece 1 with cavity 2, the radiation source 3 built-in the handpiece cavity and electrically connected to the power supply 4 through the contacts 5 of switcher 6. The bristle 7 is fixed on the transparent brush head 8.
[0025] When the filament lamp is used as a radiation source 3 (fig.2) the brush head 8 is made of color transparent material.
[0026] The brush head 8 may be covered by reflecting coating 9 (fig.3) as well it may be made of light scattering material and covered by it. In this case the bristle 7 is transparent.
[0027] The device operates in a following way. After the power supply of radiation source 3 is switched on by pressing the button of switcher 6 the radiation from the source 3 reaches the body of brush head 8 and gets in the oral cavity.
[0028] If the filament lamp is used as a radiation source 3 the spectral filter cutting the desirable spectral range should be applied because of the wide spectral band of the source. The brush head made of the color (green, blue or red) transparent material may play the role of such filter.
[0029] If the bristle is made of the transparent material especially in that case when the brush head 8 is covered by reflecting coating 9 or when the radiation is scattered within the brush head the most part of radiation reaches the bristles, concentrates in them and then reaches the places of contact between bristle 7 and teeth or gum tissues.
[0030] Photoluminescent impurities, for example, dyes inside the brush head 8 provide the irradiation of oral cavity not only by radiation delivered from the radiation source 3 but also by radiations which spectral parameters are defined by Stokes law.
[0031] The wavelength of radiation emitted by the photoluminescent substances is always longer than the wavelength of radiation source 3. If them is a single UV or blue radiation source it allows to deliver to the oral cavity the other desirable spectral components of visible and infrared light.
[0032] The example of claimed device is the following: laser diodes are SDL-2380-S with 810 nm radiation wavelength and SDL-7430 with 675 nm radiation wavelength (see Product Catalog SDL "Semiconductor Diode Lasers" 1995), light emitting diodes are LEDS-5 and LEDS-3 (blue, green, red) (see Catalog "RS components", Viena, 1995): the low-dimension power supply is VARTA chrom 547.

The industrial application:

[0033] Thus taking into account above the claimed device allows to solve the problem of profilaxis and treatment influence on oral tissues

Claims

1. A tooth brush comprising:

   a handpiece with cavity;
   a removable brush head with bristle;
   a light source; and
   a power supply,
   wherein said light source and power supply are built-in handpiece and brush head is made of transparent material.

2. The invention as defined in claim 1 wherein said light source is a laser diode.

3. The invention as defined in claim 1 wherein said light source is a light emitting diode.

4. The invention as defined in claim 1 wherein said light source is a filament lamp and brush head is made of color transparent material.

5. The invention as defined in claim 1 wherein said brush head contains light scattering materials.

6. The invention a defined in claim 1 wherein said brush head has reflecting or back scattering coating and bristle is transparent.

7. The invention as defined in claim 1 wherein said brush head contains photoluminescent substances.

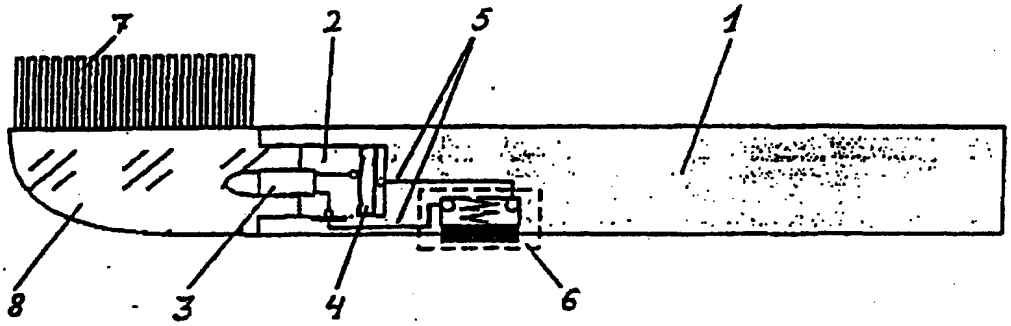

Fig .1

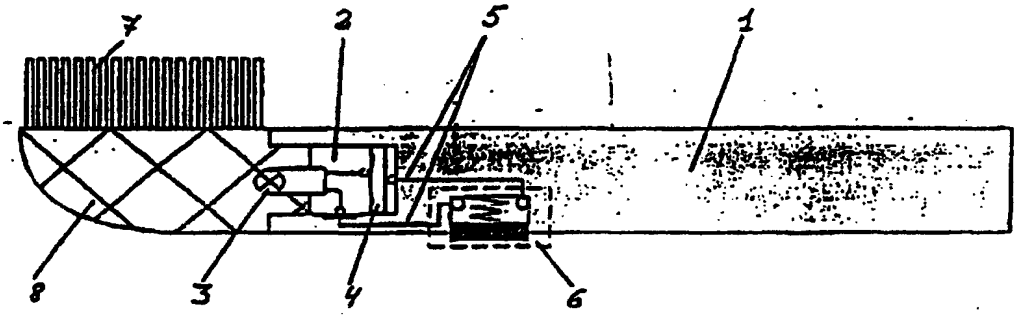

Fig .2

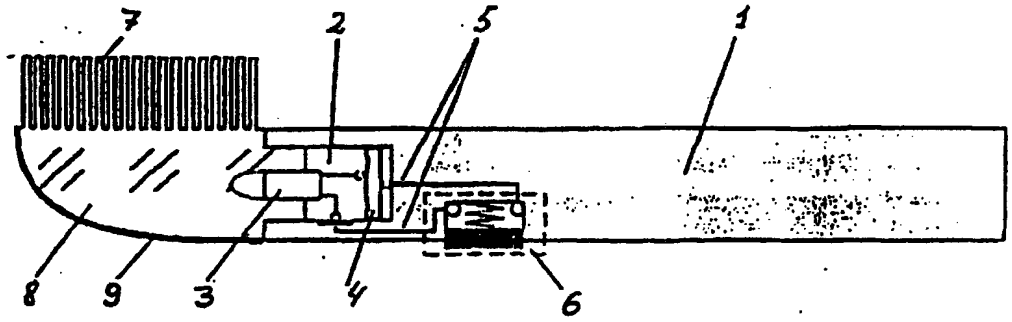

Fig .3